Track: DaVinci Clinical Data Exchange (CDex) - HEDIS/Stars

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Introduction to HEDIS/Stars

Clinical Data Exchange (CDex) is looking to improve exchange methods between providers, payers, and other systems to make exchange of health record information more efficient and effective. In turn, allowing improved care coordination, network performance, delivery of patient care and outcomes, and reducing the burden of quality reporting.

Payers use clinical information gathered from providers to support the HEDIS/Stars quality program. The Healthcare Effectiveness Data and Information Set (HEDIS) is made up of standardized performance measures to assess value of care and hold health plans accountable for their performance.

HEDIS TRC – Transitions of Care measure requires four data points- for this Connectathon we will use these documents to query for data needed to identify if the patients meet the HEDIS Stars measure.

For a patient to qualify for HEDIS/Stars TRC measure they must possess four different data elements:

1. Documentation of receipt of inpatient admission- Five Lakes
2. Documentation of receipt of discharge information
3. Follow-up visit with primary care provider within 30 days of discharge- independent primary
4. Medical reconciliation procedure within 30 days of discharge

Scenario 1-Determine eligibility of patient for HEDIS TRC criteria using HAPI FHIR® Interface

I. **Action**: Utilize FHIR® resource data and queries to determine if a patient meets the HEDIS TRC qualifications.

II. **Precondition**: Understand how to use example queries listed below to obtain required data pieces in FHIR® resources.

III. **Success Criteria**: Accurately identify the portion of patients who meet HEDIS TRC qualifications, and identify those who do not.

IV. **Example**: Possible Queries:

a. Find a patient ID using SSN
b. Find Admission Documents by Patient using DocumentReference
c. Find Discharge Documents by Patient using DocumentReference
d. Find Medication Conciliation Procedures by Patient using DocumentReference

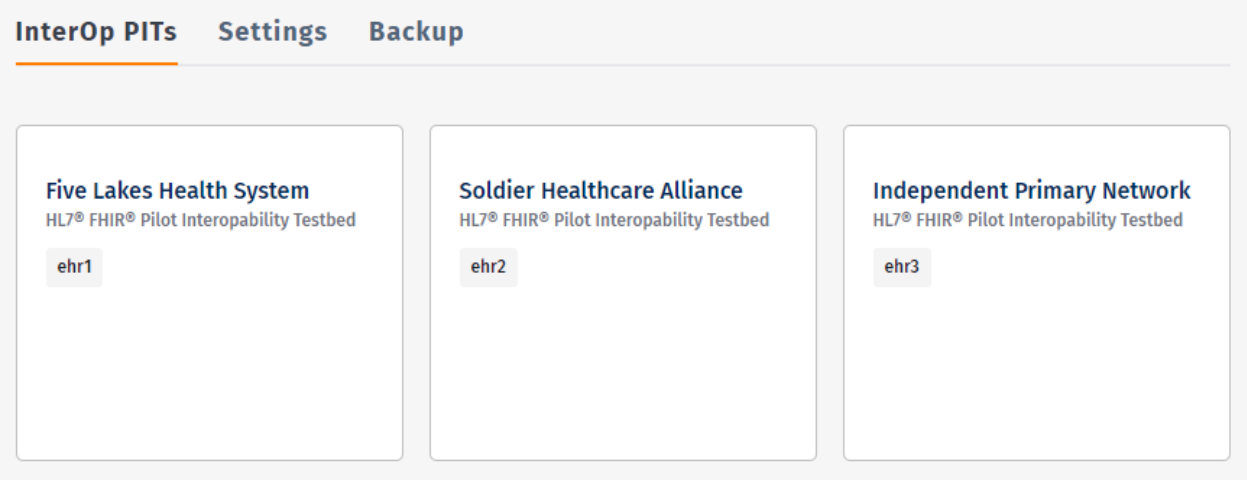
Unlock ways to identify if a patient meets the HEDIS TRC measure by leveraging FHIR® resource data via query.

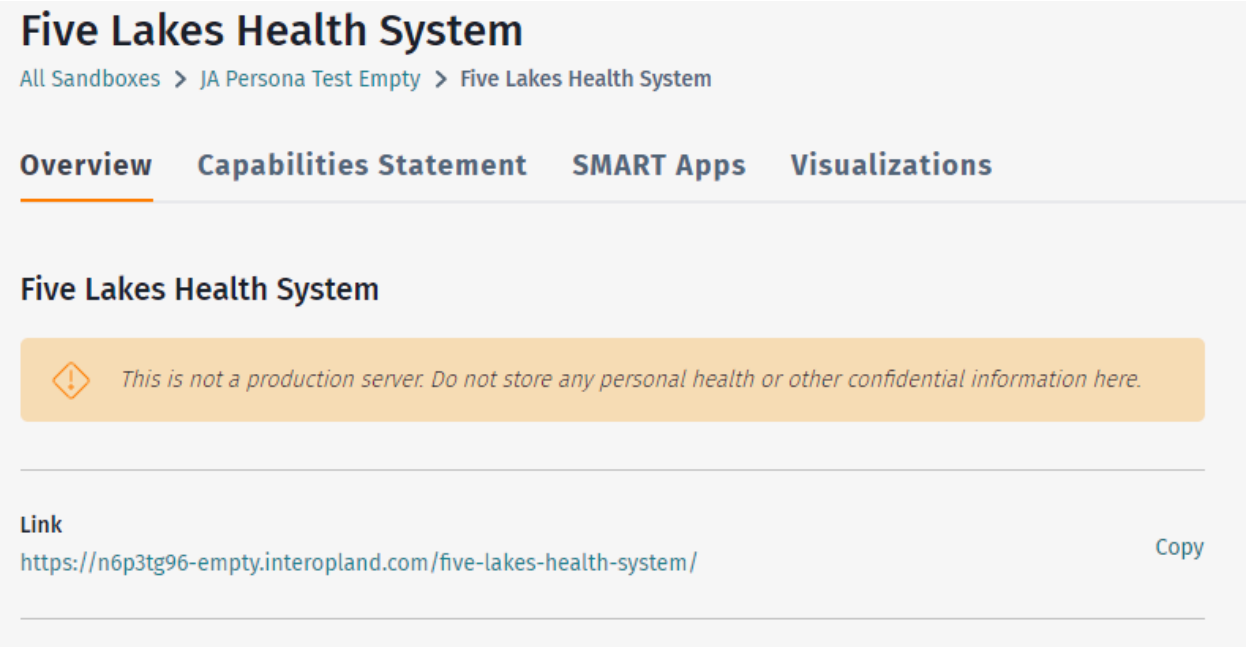
1. Documentation of receipt of inpatient admission
    - Documentation of receipt of inpatient admission is represented using a FHIR® **DocumentReference** resource containing an ADT A01 message
2. Documentation of receipt of discharge information
    - FHIR® **DocumentReference** resource containing an ADT A03 message
3. Follow-up visit with primary care provider within 30 days of discharge
    - Follow-up visit with primary care provider within 30 days of discharge is represented using a FHIR® **Encounter** Resource
4. Medication reconciliation within 30 days of discharge
    - Documented as a **Procedure** resource with a Snomed code for Medication Reconciliation procedure: 430193006

Queries for Scenario 1- Using the HAPI FHIR® Interface

Here are some examples of queries you can perform for this scenario. For this scenario we will be using the Five Lakes Health System PIT.

After you log in to interopland.com, click on the name of your Sandbox and this should display all of the PITs in your Sandbox. Click on the Five Lakes Health System PIT box (see screenshot), and then the URL in the Link section.



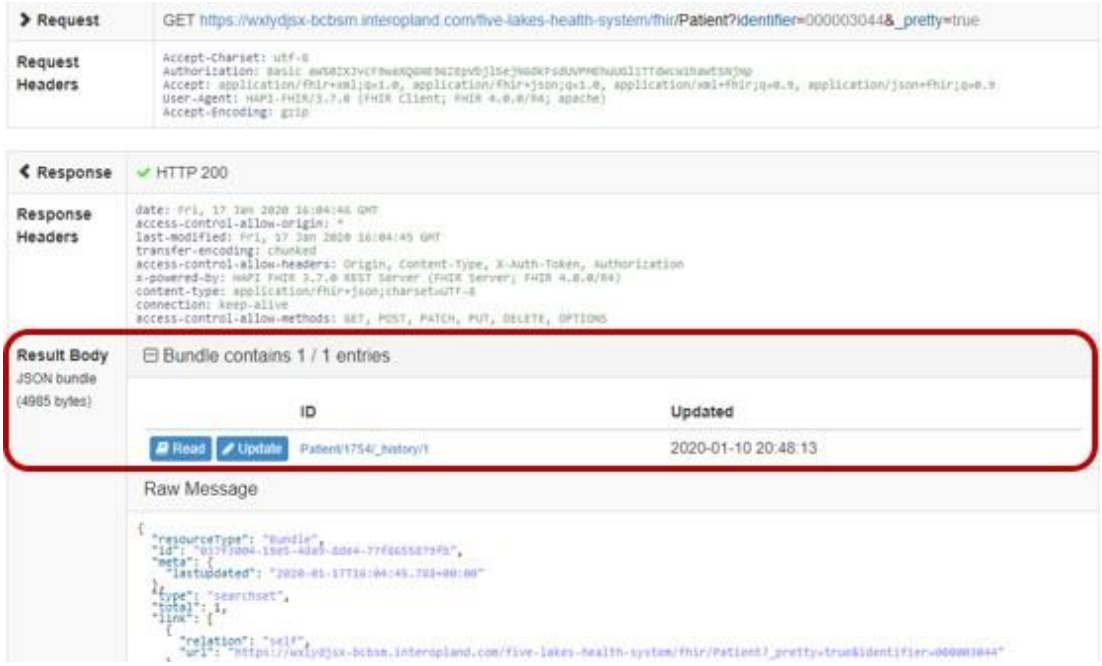


Query 1 – Finding A Patient By SSN

Because the HAPI FHIR® Interface only supports a limited set of search parameters, an additional initial query is necessary to find the Patient record by SSN. The id of the Patient record we find will be used in future queries.

Searching for a patient requires selecting the Patient option from the resource's navigation menu on the left side of the page. Specifying the SSN to search for is then accomplished by selecting the identifier option in the search parameters dropdown, then entering the target SSN in the code field to the right (as seen below SSN 000003044 is used in this example).

This query produces the result shown below. Pay particular attention to the lower-right area of the screen, which contains the section labelled Result Body. This is the data returned in response to the query.



The Result Body section in this case contains a line at the top that reads “Bundle contains 1 / 1 entries”. This line shows how many results matched the query that was specified; the first number is the count of results included in this response, the second is the total number of records satisfying that query in this PIT. When a query matches a large number of records, the numbers can be different because the FHIR® server has a limit on the number of records it can return in a single response.

Below the summary section is a section labelled Raw Message. This section contains the actual data sought by the query (in this case, a Patient record identified by the supplied SSN).

There is a wealth of information about the patient here, but the main field of interest for purposes of this exercise is the id. Specified under the “resource” element of a member of the “entry” collection, this is the unique identifier of this particular patient record within the PIT. It is what other records will use to refer to this patient and thus can be used to search for only records relevant to this patient.

```
"entry": [
  {
    "fullUrl": "https://wxlydjsx-bcbsm.interopland.com/five-lakes-health-system/fhir/Patient/1754",
    "resource": {
      "resourceType": "Patient",
      "id": "1754",
      "meta": {
        "versionId": "1",
        "lastUpdated": "2020-01-10T20:48:13.000+00:00"
```


Query 2 – Finding Admission Documents By Patient

An admission record is represented in this PIT by a DocumentReference object containing an ADT A01 message. To locate only the admission documents relevant to a specific patient, two search parameters are necessary. First, the patient is specified by choosing the subject option from the search parameter dropdown, then entering the id from the previous query's result in the Resource ID field. A second search parameter can be added by clicking the green button with a white plus sign. This second parameter should be used to specify the type of document by selecting the description option from the search parameter dropdown, then entering A01 in the value field. See below for an example.

This produces a result in the standard form for the HAPI FHIR® interface.


Result Body
JSON bundle
(5379 bytes)
Bundle contains 1 / 1 entries
ID
Updated
Read
Update
DocumentReference/20400/_history/1
2020-01-10 22:33:59
Raw Message
Date the document was added to the PIT
for Resources
Server: Local Tester
Source Code
About This Server
Reference to patient
Date of admission
Encoded original message

In the returned DocumentReference, several fields of interest can be seen. The “date” field shows the relevant date of the described document (in this case, the date the admission occurred). It should not be confused with the “lastUpdated” field, which indicates when this document was added to the PIT.

Also available here is the “data” field (located under “content” and “attachment”), which contains the encoded original message. The patient being referred to can be confirmed by examining the “subject” field, which in this case contains both the patient’s name and the reference “Patient/1754”, indicating that the subject of this document is a Patient with id 1754.

Query 3 – Finding Discharge Documents By Patient

Similar to admission records, discharge records are represented by a DocumentReference containing an ADT A03 message. They can be queried in the same fashion as admission records, using the DocumentReference resource with the “subject” and “description” search parameters.

The result has exactly the same structure as the result of the admission record query, since it is querying the same resource.

Raw Message


```
{
  "resourceType": "Bundle",
  "id": "799f7fa9-e7f2-433f-9ac4-1ec855601527",
  "meta": {
    "lastUpdated": "2020-01-17T17:02:09.359+00:00"
  },
  "type": "searchset",
  "total": 1,
  "link": [
    {
      "relation": "self",
      "url": "https://wxlydjsx-bcbsm.interopland.com/five-lakes-health-system/fhir/DocumentReference?_pretty=true&description=A03&subject
=1754"
    }
  ],
  "entry": [
    {
      "fullUrl": "https://wxlydjsx-bcbsm.interopland.com/five-lakes-health-system/fhir/DocumentReference/20401",
      "resource": {
        "resourceType": "DocumentReference",
        "id": "20401",
        "meta": {
          "versionId": "1",
          "lastUpdated": "2020-01-10T22:33:59.000+00:00"
        },
        "text": {
          "status": "generated",
          "div": "<div xmlns=\"http://www.w3.org/1999/xhtml\">This is a simple example with only plain text</div>"
        },
        "extension": [
          {
            "url": "http://mihin.org/extension/copyright",
            "valueString": "Copyright 2014-2019 Michigan Health Information Network Shared Services. Licensed under the Apache License, V
ersion 2.0 (the 'License'); you may not use this file except in compliance with the License. You may obtain a copy of the License at  htt
p://www.apache.org/licenses/LICENSE-2.0.  Unless required by applicable law or agreed to in writing, software distributed under the Licen
se is distributed on an 'AS IS' BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied. See the License for the s
pecific language governing permissions and limitations under the License."
          }
        ],
        "masterIdentifier": {
          "use": "official",
          "value": "03dd2a09-f165-4277-9846-6e153f3fe428"
        },
        "identifier": [
          {
            "use": "official",
            "value": "03dd2a09-f165-4277-9846-6e153f3fe428"
          }
        ],
        "status": "current",
        "docStatus": "final",
        "type": {
          "coding": [
            {
              "system": "http://loinc.org",
              "code": "18842-5",
              "display": "Discharge summary"
            }
          ]
        },
        "subject": {
          "reference": "Patient/1754",
          "display": "Alex Melvin Kaufman"
        },
        "date": "2021-01-02T20:00:00.000+00:00",
        "author": {
          "reference": "Practitioner/20399",
          "display": "Arnold McPherson Bolton MD"
        },
        "custodian": {
          "reference": "Organization/17841",
          "display": "Taylor Methodist Hospital"
        },
        "description": "A03 of encounter Id = 03dd2a09-f165-4277-9846-6e153f3fe428",
        "content": [
          {
            "attachment": {
              "data": "TVNIFF5+XCZ8TUlISU5eUEFUSUVOVCBHRU58MS4yLjMuNC41LjkuOTkuOTk5Ljk5OTkuMTAyNHx8Mi4xNi44NDAuMS4xMTM4ODMuMy4xNDgxfDIwMj
EwMTAyMjAwMDAwKzAwMDB8fEFEVF5BMDNeQURUX0EwM3wxMDE2NnxQfDIuNnwxMDE2NXx8fHx8fHx8fFRheWxvciBNZXRob2Rpc3QgSG9zcGl0YWwNRVZOfHwyMDIxMDEwMjIwMDA
wMCswMDAwfHx8fHwxLjIuMy40LjUuOS45OS45OTkuOTk5OS4xMDI0DVBJRHwxfDMwNDR8MWZlMTA4YjQ1NGYwNDRkYTlmMTYzZWVhMjU1MThmNzdeX15eQ0tTfjAwMDAwMzA0NF5e
X15TU3x8S2F1Zm1hbl5BbGV4fHwxOTgwMDgwNnxNfHwyMTA2LTNeV2hpdGVeSEw3MDAwNXw0N1BSaGluZSBBdmVudWVeXkNsaW9eTuleNDg0MjB8fHx8fHx8fDAwMDAwMzA0NHx8f
DIxODYtNV5Ob3QgSGlzcGFuaWMgb3IgTGF0aW5vXkhMNzAxODl8fHx8fHx8MjAyMTAxNDIyMDAwMDArMDAwMHxODVBEMXx8fFRheWxvciBNZXRob2Rpc3QgSG9zcGl0YWxeX15eX1
5eXl4xLjIuMy40LjUuOS45OS45OTkuOTk5OS4xMDI0fDk5OTk5OTI0NTJeQm9sdG9uXkFybm9sZF5eXl5eXl5eXl5OUE1eXl5eXl5ekk1EDVBWMXwxfEl8Xl4xOV4xLjIuMy40LjU
uOS45OS45OTkuOTk5OS4xMDI0fHx8fDk5OTk5OTI0NTJeQm9sdG9uXkFybm9sZF5eXl5eXl5eXl5OUE1eXl8fHx8fHx8fHwwMZRkMmEwOS1mMTY1LTQyNzctOTg0Ni1i2ZTE1M2Yz
ZmU0M3h8fHx8fHx8fHx8fHx8fHx8fHx8fHx8fDIwMjEwMTAyMjAwMDAwDURHMXwxfHwyNzgzNjAwN15QZXJ0dXNzaXMgKGRpc29yZGVyKV5TQ1R8fDIwMjEwMTAyMjAwMDAwK
zAwMDB8RnxeUGVydHVzc2lzX0luZmVjdGlvbl9Db2RlXzENRExfD38fDc2OTkxMDAwMTE5MTA5Xkh1bWFuIGltbXVub2RlZmljaWVuY3kgdmlydXMgKEhJVikgaW5mZWN0aW9uIG
NhdGVnb3J5IEIyIChkaXNvcmRlcileU0UfHwyMDIxMDEwNjIwMDAwMCswMDAwfEZ8XkRldmVsb3BFSlWX0NvZGVfMg1ERzF8M3X8ODY4NDkwMDReU3VpY2lkYWwgZGVsaWJlcmF
0ZSBwb2lzb25pbmdeU0NUfHwyMDIxMDEwMjIwMDAwMCswMDAwfEZ8XkF0dGVtcHF2uGF5pc29uaW5nDURHMXw0fHwxMzU4ODMwMDNeQ291Z2ggd2l0aCBmZXZlciAoZmluZGlu
ZyleU0NUfHwyMDIxMDEwMjIwMDAwMCswMDAwfEZ8XkNvdWdoDUDRHMXw1fHw2NDUzMTAwM15OYXNhbCBkaXNjaGFyZ2UgKGZpbmRpbmcpXlNDVHx8MjAyMTAxMDIyMDAwMDArMDAwMH
HxGfF5SdW5ueSBOb3NlDURHMXw2fHwzODY2NjEwMDZeRmVZZXIgKGZpbmRpbmcpXlNDVHx8MjAyMTAxMDIyMDAwMDArMDAwMHHxGfF5GZXZlcg1ERzF8N3x8NDMwMjUwMDheUGFyb3
h5c21hbCBDb3VnaF5TQIR8fDIwMjEwMTAyMjAwMDAwKzAwMD88RnxeUGFyb3h5c21hbCBDb3Vna1ERzF8OHx8MzUwNjQwNDVeRGFyayBTdG9vbHNeU0UfHwyMDIxMDEwMjIwMDA
wMCswMDAwfEZ8XkRhcmsgU3Rvb2xzDURHMXw5fHw0MjI0MDAwMDheVm9taXRpbmdeU0NUfHwyMDIxMDEwMjIwMDAwMCswMDAwfEZ8XlZvbWl0aW5nDUlOMXwxfDE3NzJeU1RBVEug
SEVBTFRIIFBNQU58MTAyN3xNRURJQ0FJRHx8fHx8fHx8fHx8fEthdWZtYW5eQWx1eF5NZWx2aW58fHw0NiBSaGluZSBBdmVudWVeXkNsaW9eTuleNDg0MjAN"
            }
          }
        ]
      },
      "search": {
        "mode": "match"
      },
      "response": {
        "status": "201 Created",
        "etag": "W/\"1\""
      }
    }
  ]
}
```


Server: Local Tester Source Code About This Server

Date of Discharge-Day 1 of 30 day window for follow up and medication reconciliation

The date field is once again of primary interest, showing the date of the patient's discharge (and thus establishing the beginning of the 30 day window in which the follow-up visit and MedRec procedure must occur in order to satisfy the HEDIS quality measure).

Query 4 – Finding Medication Reconciliation Procedures By Patient

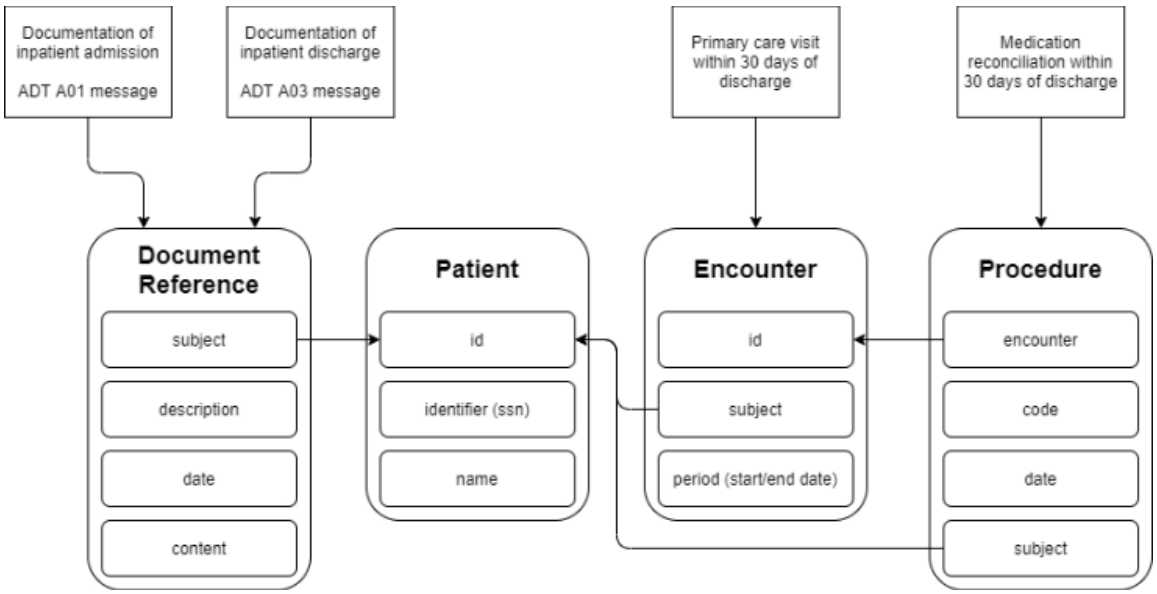
When a Medication Reconciliation is performed, it is recorded under the Procedure resource. This resource can be queried using the subject parameter in the same fashion as the DocumentReference resource in the previous two queries. This will restrict the result to only procedures performed on the specified patient. The search results can be further refined by using the code search parameter to retrieve only Medication Reconciliation procedures (based on the Snomed code for that procedure: 430193006).

The result details each procedure that fits the specified criteria.


```
{
  "resourceType": "Bundle",
  "id": "0e55c80e-966f-4db6-bfb5-d63de0263813",
  "meta": {
    "lastUpdated": "2020-01-17T17:08:15.336+00:00"
  },
  "type": "searchset",
  "total": 1,
  "link": [
    {
      "relation": "self",
      "url": "https://wxlydjsx-bcbsm.interopland.com/five-lakes-health-system/fhir/Procedure?_pretty=true&code=430193006&subject=1754"
    }
  ],
  "entry": [
    {
      "fullUrl": "https://wxlydjsx-bcbsm.interopland.com/five-lakes-health-system/fhir/Procedure/20727",
      "resource": {
        "resourceType": "Procedure",
        "id": "20727",
        "meta": {
          "versionId": "1",
          "lastUpdated": "2020-01-10T22:36:50.000+00:00"
        },
        "text": {
          "status": "generated",
          "div": "<div xmlns=\"http://www.w3.org/1999/xhtml\">This is a simple example with only plain text</div>"
        },
        "extension": [
          {
            "url": "http://mihin.org/extension/copyright",
            "valueString": "Copyright 2014-2019 Michigan Health Information Network Shared Services. Licensed under the Apache License, V
ersion 2.0 (the 'License'); you may not use this file except in compliance with the License. You may obtain a copy of the License at  htt
p://www.apache.org/licenses/LICENSE-2.0.  Unless required by applicable law or agreed to in writing, software distributed under the Licen
se is distributed on an 'AS IS' BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied. See the License for the s
pecific language governing permissions and limitations under the License."
          }
        ],
        "status": "completed",
        "code": {
          "coding": [
            {
              "system": "http://snomed.info/sct",
              "code": "430193006",
              "display": "Medication Reconciliation (procedure)"
            }
          ]
        },
        "subject": {
          "reference": "Patient/1754",
          "display": "Alex Melvin Kaufman"
        },
        "encounter": {
          "reference": "Encounter/20723",
          "display": "Outpatient_Encounter"
        },
        "performedPeriod": {
          "start": "2021-01-22T13:00:00+00:00",
          "end": "2021-01-22T13:00:00+00:00"
        },
        "performer": [
          {
            "actor": {
              "reference": "Practitioner/49",
              "display": "Regina Gould Melton MD"
            }
          }
        ],
        "location": {
          "reference": "Location/29",
          "display": "Lansing Northside Urgent Care Center"
        },
        "reasonReference": [
          {
            "reference": "https://~/five-lakes-health-system/fhir/DocumentReference/20724",
            "display": "CCD of Encounter-17825[2021/01/22: Outpatient_Encounter, Alex Melvin Kaufman[40] saw Regina Gould Melton MD in La
nsing Northside Urgent Care Center]"
          }
        ]
      },
      "search": {
        "mode": "match"
      },
      "response": {
        "status": "201 Created",
        "etag": "W/\"1\""
      }
    }
  ]
}
```


The performedPeriod field shows when the procedure began (“start”) and concluded (“end”). To complete the chart chase and determine whether the HEDIS quality measure was satisfied for this patient’s hospital visit, the end subfield of performedPeriod can be

compared to the date of the discharge form to determine whether the procedure occurred within the 30-day time period after the discharge.



Scenario 2- Calculating total patients in a health system who meet HEDIS TRC eligibility criteria

The current validation process for substantiating completed HEDIS measures includes querying medical facilities for missing documentation, also known as the "chart chase". This process requires human intervention to conduct chart chasing to gather additional documentation for audit. The challenge for this scenario is to determine cases where the HEDIS criteria are *almost* met but missing one or more pieces of data.

Conceptualize a process that queries the EHR to return the data required for the audit.

I. **Action:** Determine cases where the HEDIS criteria are *almost* met but missing one or more pieces of data.

II. **Precondition**: Understand how to use example FHIR® queries listed below to obtain required data pieces.

III. **Success Criteria**: Identifying patients who do not qualify for HEDIS/Stars using FHIR® queries, potentially *using external API's and custom code*.

IV. **Example**:

a. Query 1: All Admission documents
b. Query 2: All Discharge documents
c. Query 3: All medication reconciliation procedures

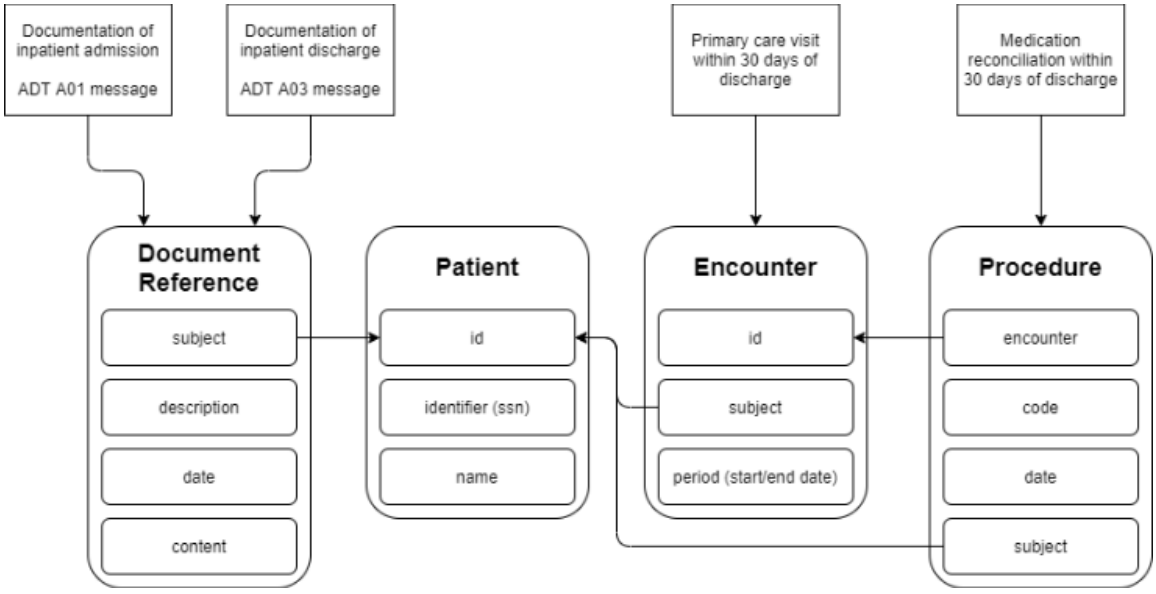
HEDIS TRC – Transitions of Care measure requires four data points:

1. Documentation of receipt of inpatient admission
    - Documentation of receipt of inpatient admission is represented using a FHIR® **DocumentReference** resource containing a ADT A01 message
2. Documentation of receipt of discharge information
    - Documentation of receipt of inpatient discharge is represented using a FHIR® **DocumentReference** resource containing a ADT A03 message
3. Follow-up visit with primary care provider within 30 days of discharge
    - Follow-up visit with primary care provider within 30 days of discharge is

represented using a FHIR® **Encounter** Resource

4. Medication reconciliation within 30 days of discharge
    - Documented as a **Procedure** resource with a Snomed code for Med Reconciliation procedure: 430193006

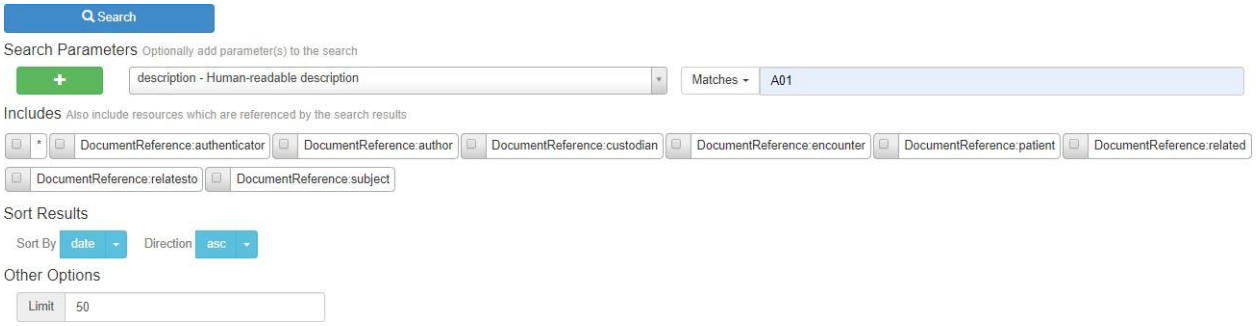
The challenge is to retrieve groups of records for these situations where a single piece of data is missing – such as when all conditions are met except the follow-up visit, or the medication reconciliation. **As it could be difficult to acquire all of the necessary data in a single query, the use of external APIs and custom code may be required for this portion.**



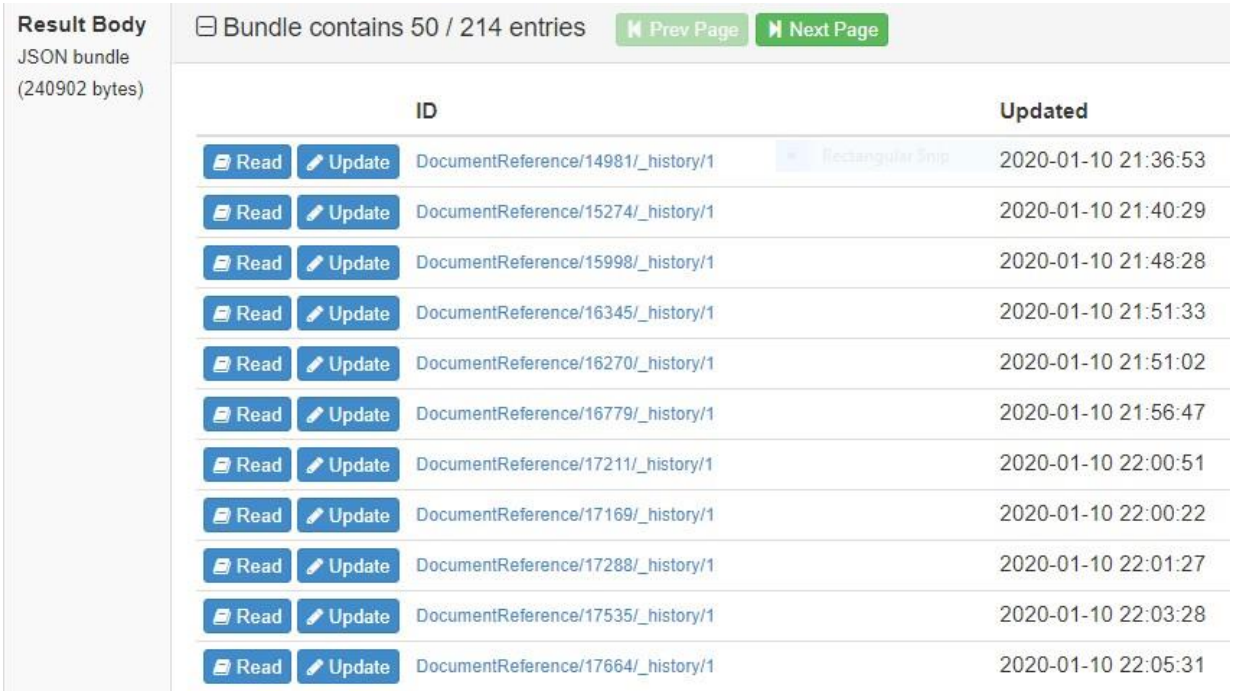
Queries for Scenario 2- Using the HAPI FHIR® Interface

Query 1 – All Admission Documents

When performing queries that return a potentially large number of results, additional features of the HAPI FHIR® interface become relevant. The sort dropdowns allow the specification of an order for the results to be returned in and the limit field specifies the number of results to return per page.

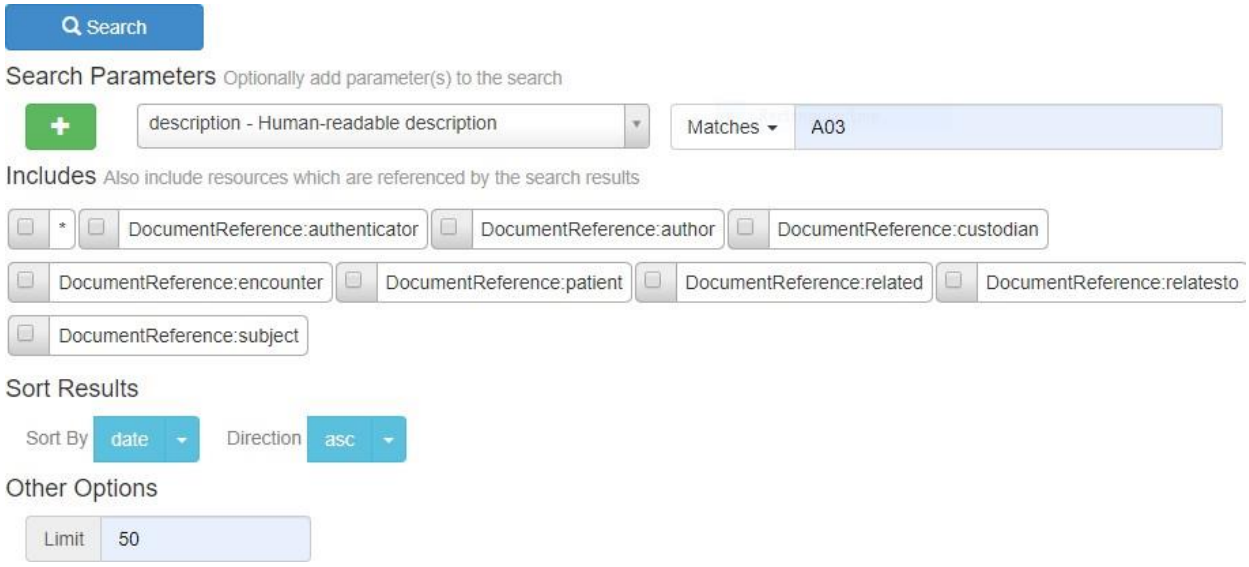


In addition to the raw JSON, the response contains individual links to each returned item. Clicking one of the “Read” buttons will launch a query by id for that item in a new window.



Query 2 – All Discharge Documents

As was the case when examining a single patient's records, bulk retrieval of discharge documents is almost identical to bulk retrieval of admission documents.

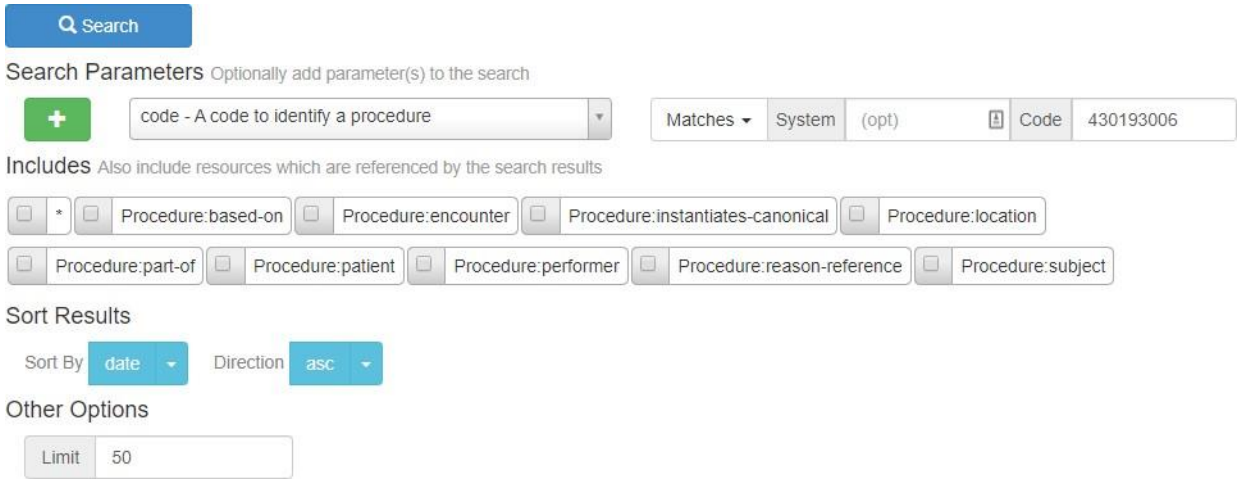


The result list can be examined to determine which patients need to have a medication reconciliation procedure in order to satisfy the HEDIS measure and when the 30-day windows for each of those procedures begin.


```
},
"subject": {
  "reference": "Patient/4206",
  "display": "Jeffrey Paul Montgomery"
},
"date": "2020-01-05T01:00:00.000+00:00",
```

Query 3 – All Medication Reconciliation Procedures

Querying for all Medication Reconciliation procedures follows the same basic form as the DocumentReference bulk queries.



HEDIS TRC compliance can now be determined by comparing the medication reconciliation procedures returned by this query to the list of discharge documents returned by the previous one.


```
"code": {
  "coding": [
    {
      "system": "http://snomed.info/sct",
      "code": "430193006",
      "display": "Medication Reconciliation (procedure)"
    }
  ]
},
"subject": {
  "reference": "Patient/185",
  "display": "Arlene Day Travis"
},
"encounter": {
  "reference": "Encounter/187",
  "display": "Outpatient_Encounter"
},
"performedPeriod": {
  "start": "2016-01-27T13:20:00+00:00",
  "end": "2016-01-27T13:20:00+00:00"
},
```


Note that the patient's displayed name in the subject field is not guaranteed to be unique, so comparisons should rely on the reference id instead

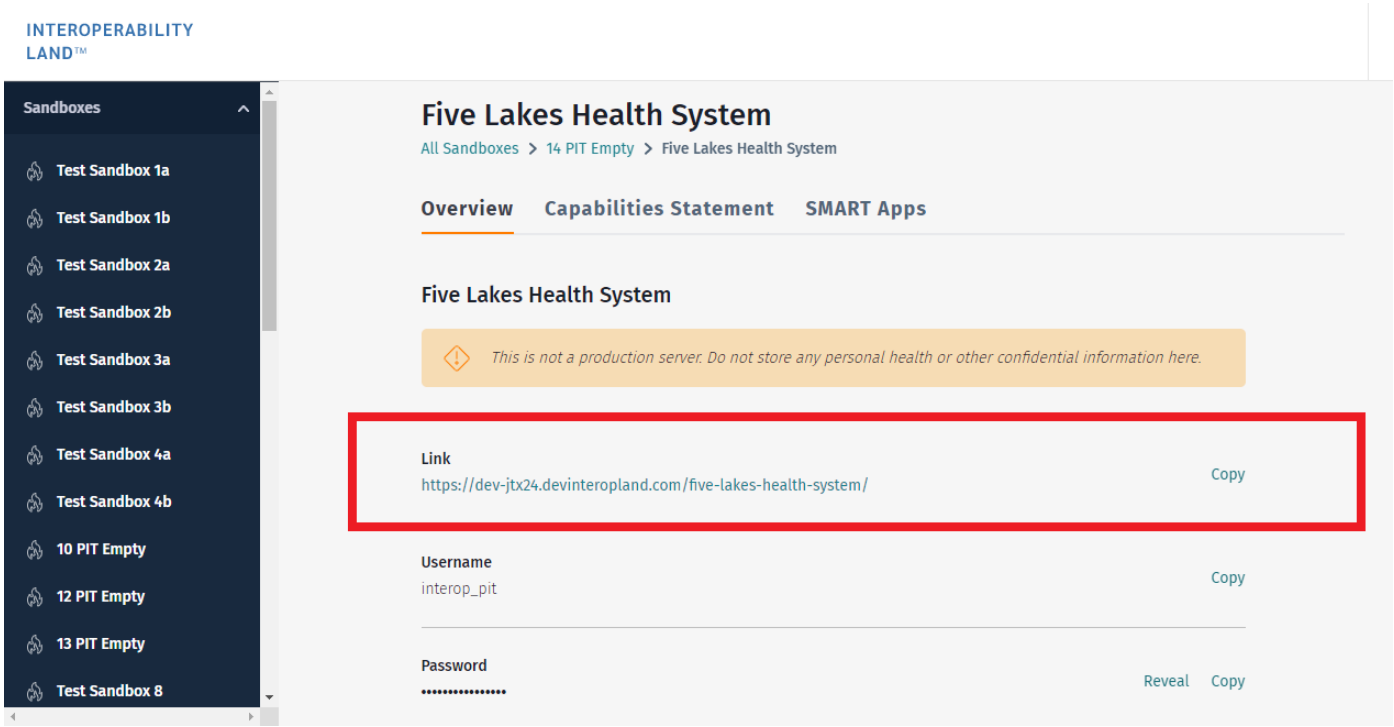
Rest Client Guide: Performing a Basic Query in Postman for HEDIS/Stars Transition of Care Measure

Postman is a tool for API testing that helps organize HTTP requests before sending them to a server. It can be used it as an alternative to the front end query tool.

First the URL needs to be found. The below is an example:

https://<<Interoperability Land PIT details>>.interopland.com/<<FHIR®-PIT-NAME>>/FHIR®/Patient?identifier=000003142

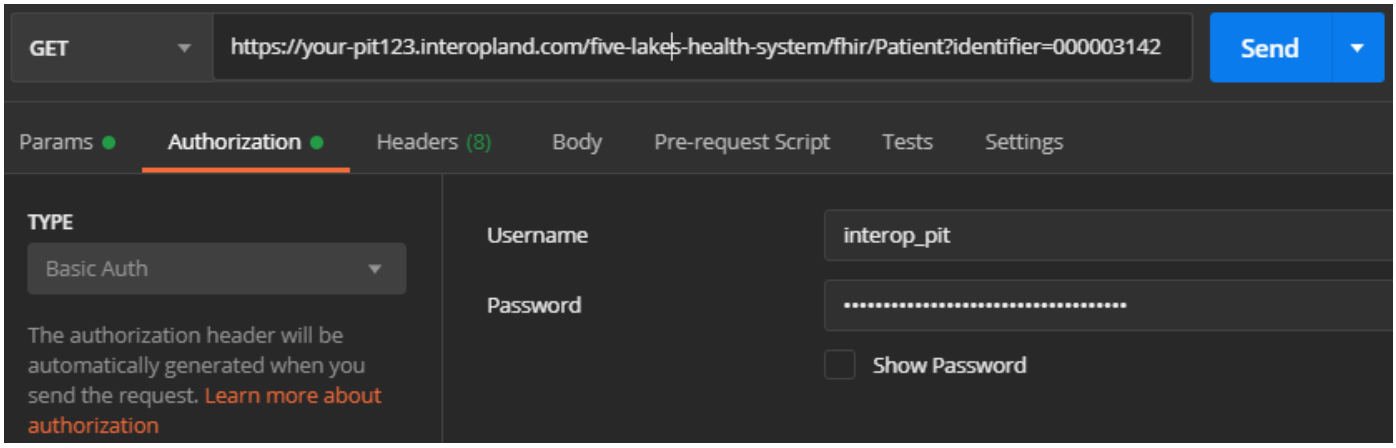
This URL and all other details needed for testing using Postman can be found in the Interoperability Land PIT Overview section for a given PIT. The PIT Tab Menu, covered earlier in this guide explains in detail where to find it. By copying the PIT details on the Interoperability Land front end, a full version of the URL above can be obtained.



Next, authorization needs to be set up in Postman. Further down in the above screenshot are fields for Username and Password. These go in the “Authorization” tab of Postman, with type set to ‘Basic Auth’.

Once authorization has been set up, after clicking the ‘Send’ button in Postman, an

HTTP GET request is generated and sent to the server to query for any **Patient** resources with an identifier(ssn) of 000003142.



Utilizing Postman and the Restful API, it is possible to craft more complex queries. In the Appendix of this document, more advanced examples are given that show how to query for data over a range of dates as well as how to retrieve data from other FHIR® resources related to patient.

Despite the versatility of the Restful API, use of external code libraries and APIs may be required in the cases where dynamic queries need to be built from the results of an initial query. The Appendix contains a small snippet generated from the HAPI FHIR® java project that exemplifies a more complex querying scenario, and participants in the Connectathon should feel free to use their own preferred FHIR® R4 libraries if they wish.

In order to deal with the limitations of the Restful API, use of external code libraries and APIs may be required to handle more complex queries. A supplementary guide to this one contains a small snippet generated from the HAPI FHIR® java project that exemplifies a more complex querying scenario, and participants in the Connectathon should feel free to use their own preferred FHIR® R4 libraries if they wish.

Judging Criteria

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Interoperability: APIs and FHIR® Heat Up

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Alignment with Track	Helps to improve Inter-operability	Innovation & Creativity	Use of APIs	User Experience	Technical Difficulty	Presentation or Demo
25%	25%	15%	10%	10%	10%	5%
How aligned was the solution with one of the event Tracks?	Does the team clearly show how their solution could be used to improve interoperabil-ity?	Did the team create some-thing that has not already been created? Is it unique?	Did the team use APIs available to create a solution?	What is the wow factor? Would others be impressed by what was built? How easy is the solution to use?	Is the project technically impressive / complex? Is it remarkable that a team created this solution in the time allowed?	Was the presentation or demo well put together? Did the team seem prepared? How well did they explain the problem and solution? (only judge on content, not video quality)

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